



An inexact dynamic optimization model for municipal solid waste management in association with greenhouse gas emission control

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Abstract:

Municipal solid waste (MSW) should be properly disposed in order to help protect environmental quality and human health, as well as to preserve natural resources. During MSW disposal processes, a large amount of greenhouse gas (GHG) is emitted, leading to a significant impact on climate change. In this study, an inexact dynamic optimization model (IDOM) is developed for MSW-management systems under uncertainty. It grounds upon conventional mixed-integer linear programming (MILP) approaches, and integrates GHG components into the modeling framework. Compared with the existing models, IDOM can not only deal with the complex tradeoff between system cost minimization and GHG-emission mitigation, but also provide optimal allocation strategies under various emission-control standards. A case study is then provided for demonstrating applicability of the developed model. The results indicate that desired waste-flow patterns with a minimized system cost and GHG-emission amount can be obtained. Of more importance, the IDOM solution is associated with over 5.5 million tonnes of TEC reduction, which is of significant economic implication for real implementations. Therefore, the proposed model could be regarded as a useful tool for realizing comprehensive MSW management with regard to mitigating climate-change impacts.

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Resource Description

Exposure : ☒

weather or climate related pathway by which climate change affects health

Unspecified Exposure

Geographic Feature: ☒

resource focuses on specific type of geography

None or Unspecified

Geographic Location: ☒

resource focuses on specific location

Global or Unspecified

Health Impact: ☒

Climate Change and Human Health Literature Portal



specification of health effect or disease related to climate change exposure

Health Outcome Unspecified

Mitigation/Adaptation:

mitigation or adaptation strategy is a focus of resource

Mitigation

Model/Methodology:

type of model used or methodology development is a focus of resource

Methodology

Resource Type:

format or standard characteristic of resource

Research Article

Timescale:

time period studied

Time Scale Unspecified